Claims

[c1] 1. A method for analyzing nucleic acids using a plurality of nucleic acid microarrays, comprising the steps of:
(1) preparing a cell sample having nucleic acids; and
(2) contacting the sample with an apparatus that comprises
one or more containing members constructed and arranged to contain the plurality of nucleic acid microarrays, and
a separating member constructed and arranged so that, when the separating member is disposed in a first position with respect to the containing members, at least two of the plurality of nucleic acid microarrays are fluidically separated from each other by the separating member, and when the separating member is disposed in a second position with respect to the containing members, the at least two microarrays are fluidically coupled with each other.

[c2] 2. An apparatus for processing a plurality of microarrays disposed on a substrate, comprising:
one or more containing members constructed and arranged to contain the substrate; and
a separating member constructed and arranged so that,
when the separating member is disposed in a first position with respect to the containing members, at least two of the plurality of microarrays are fluidically separated from each other by the separating member, and
when the separating member is disposed in a second position with respect to the containing members, the at least two microarrays are fluidically coupled with each other.

[c3] 3. The apparatus of claim 2 , wherein:
the one or more containing members include a first segment and a second segment in contact with the first segment, wherein the substrate is disposed between the first and second segments.

[c4] 4. The apparatus of claim 3 , wherein:
the separating member is disposed between the first and second segments when the separating member is in the first position, and is disposed apart from the first

and second segments when the separating member is in the second position.

[c5] 5. The apparatus of claim 3 , wherein:
the substrate is retained in place by the first and second segments.

[c6] 6. The apparatus of claim 3 , wherein:
the first segment includes a central frame.

[c7] 7. The apparatus of claim 6 , wherein:
the central frame includes an inlet port for receiving fluids and an outlet port for expelling fluids.

[c8] 8. The apparatus of claim 2 , wherein:
the separating member includes one or more walls constructed and arranged to fluidically separate the at least two microarrays when the separating member is disposed in the first position.

[c9] 9. The apparatus of claim 8 , wherein:
the separating member includes a grid plate.

[c10] 10. The apparatus of claim 9 , wherein:
the grid plate includes a plurality of grid elements determined by the one or more walls, wherein each of the at least two microarrays is fluidically separated from each of the other at least two microarrays by a grid element when the separating member is disposed in the first position, and wherein each of the at least two microarrays is fluidically coupled with the other at least two microarrays when the separating member is disposed in the second position.

[c11] 11. The apparatus of claim 10 , wherein:
the plurality of grid elements is equal in number to the plurality of microarrays.

[c12] 12. The apparatus of claim 2 , wherein:
the plurality of microarrays include synthesized probe arrays wherein the probes comprise oligonucleotides.

[c13] 13. The apparatus of claim 12 , wherein:
the oligonucleotides are synthesized to the microarrays based, at least in part, on

photolithography.

[c14] 14. The apparatus of claim 2 , wherein:
the plurality of microarrays are disposed on a contiguous surface of the substrate.

[c15] 15. The apparatus of claim 14 , wherein:
the contiguous surface of the substrate comprises a photolithographic wafer.

[c16] 16. An apparatus for processing a plurality of microarrays disposed on a substrate, comprising:
one or more containing members including a first segment and a second segment, wherein the substrate is disposed between the first and second segments; and
a separating member including a grid plate having a plurality of grid elements constructed and arranged so that,
when the separating member is disposed in a first position with respect to the containing members, at least two of the plurality of microarrays are fluidically separated from each other by one or more of the grid elements, and
when the separating member is disposed in a second position with respect to the containing members, the at least two microarrays are fluidically coupled with each other.

[c17] 17. A method for processing a plurality of microarrays, comprising the steps of:
(1) providing a substrate upon which the microarrays are disposed;
(2) fluidically separating at least two of the plurality of microarrays from each other;
(3) contacting the at least two microarrays with one or more target solutions while the at least two microarrays are fluidically separated;
(4) retaining the fluidic separation of the at least two microarrays for a first period of time sufficient for hybridization reactions, if any, to occur between the target solutions and the at least two microarrays;
(5) fluidically coupling the at least two microarrays after the first period has elapsed; and
(6) performing one or more parallel fluidic processes on the at least two microarrays based, at least in part, on the fluidic coupling.

[c18] 18. The method of claim 17, further comprising the step of:

(7) removing at least a portion of the one or more target solutions after the first period has elapsed and prior to performing step (5).

[c19] 19. The method of claim 17, wherein:

the one or more fluidic processes include one or more of the group consisting of removing at least a portion of the one or more target solutions, washing, staining, or preserving.

[c20] 20. The method of claim 17, further comprising the step of:

(7) providing one or more containing members including a first segment and a second segment in contact with the first segment, wherein the substrate is disposed between the first and second segments.

[c21] 21. The method of claim 17, wherein:

the substrate comprises a contiguous surface.

[c22] 22. The method of claim 17, wherein:

the microarrays include synthesized probe arrays.

[c23] 23. The method of claim 17, wherein:

step (2) includes disposing a grid plate having a plurality of grid elements on the substrate in a first position so that each of the at least two microarrays is aligned with a grid element.

[c24] 24. The method of claim 23, wherein:

the grid elements include walls that, when the grid plate is in the first position, contribute to fluidically separating the at least two microarrays from each other.

[c25] 25. The method of claim 23, wherein:

step (5) includes moving the grid plate in the first position to a second position away from the substrate.

[c26] 26. The method of claim 17, wherein:

the plurality of microarrays include synthesized probe arrays wherein the probes comprise oligonucleotides.

[c27] 27. A method for processing a plurality of microarrays, comprising the steps of:
(1) providing one or more containing members including a first segment and a second segment in contact with the first segment;
(2) disposing a substrate between the first and second segments, wherein the plurality of microarrays are disposed on a contiguous surface of the substrate comprising a photolithographic wafer;
(3) fluidically separating at least two of the plurality of microarrays from each other;
(4) contacting the at least two microarrays with one or more target solutions while the at least two microarrays are fluidically separated;
(5) retaining the fluidic separation of the at least two microarrays for a first period of time sufficient for hybridization reactions, if any, to occur between the target solutions and the at least two microarrays;
(6) fluidically coupling the at least two microarrays after the first period has elapsed; and
(7) performing one or more parallel fluidic processes on the at least two microarrays based, at least in part, on the fluidic coupling.

[c28] 28. A microarray processing system, comprising:
a first segment;
a second segment in contact with the first segment; and
a processing array positioned between the first segment and the second segment, and retained in place by the first and second segments.

[c29] 29. The microarray processing system of claim 28, wherein:
the processing array includes
a plate member between the first and second segment, wherein the plate member includes a first surface,
a grid segment containing an array of chamber walls, and
a bottom support segment,
wherein, when the grid segment is disposed in a first position between the bottom support segment and the plate member, multiple processing chambers are formed that each include as a first chamber surface a portion of the first surface of the plate member, as a second chamber surface opposed to the first chamber surface a

portion of the bottom support segment, and as walls an array element of the array of chamber walls.

[c30] 30. The microarray processing system of claim 29 , further comprising:
a first grid seal between the plate member and the grid segment, and
a second grid seal between the grid segment and the bottom support segment.

[c31] 31. The microarray processing system of claim 29 , wherein:
a plurality of microarrays are disposed on the first surface of the plate member, and
when the grid segment is disposed in the first position, the multiple processing chambers align with and fluidically separate the plurality of microarrays.

[c32] 32. The microarray processing system of claim 31 , wherein:
the grid segment is movable between the first position and a second position in which the multiple processing chambers are not aligned with the plurality of microarrays.

[c33] 33. The microarray processing system of claim 31 , wherein:
the grid segment is movable between the first position and a second position in which the multiple processing chambers do not fluidically separate the plurality of microarrays.